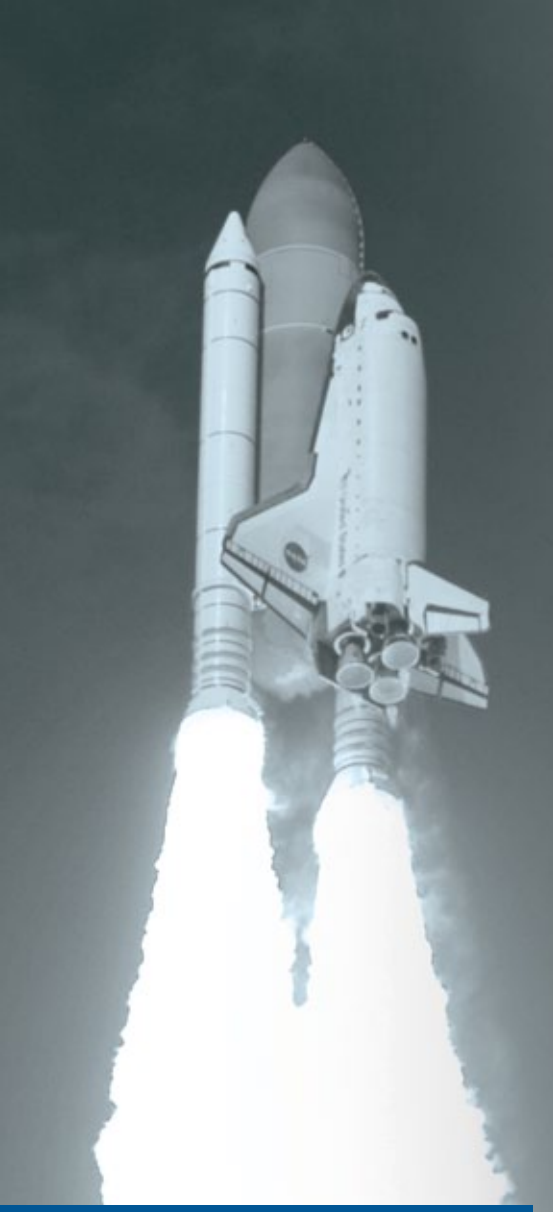
National Aeronautics and
Space Administration

marshall

NASA Marshall Space Flight Center
An Engine of Opportunity

FY2009 Economic Impact



Marshall Space Flight Center

Launching the Future of Science and Exploration

Marshall Space Flight Center plays a key role in NASA's missions – from space launch systems to support for living and working in space to exploring worlds beyond our own.

While Marshall is best known for rocket and propulsion research and development, the center also manages science operations for the International Space Station. Experts at the center develop and maintain systems to recycle air and water onboard. The center helps develop and manage missions of scientific exploration in our solar system and beyond. Marshall partners with academic institutions and organizations around the world to improve weather prediction and monitor changes in the Earth's climate.

The technology developed at Marshall affects many aspects of life on Earth, creates a better understanding of the universe, and enables humans to envision a future of exploration and scientific discovery.

Milestones 2009–2010

- Successful parachute tests for drogue parachute for Ares I rocket (February 2009)
- Final Hubble refurbish mission adding state-of-the-art science instruments to extend telescope's capabilities (May 2009)
- J-2X engine gas generator test (August 2009)
- Ares I-X flight test (October 2009)
- Successful Robotic Lander drop test (November 2009)
- Installation of final U.S. space station segments delivered (February 2010)
- Record number of teams at Great Moonbuggy Race (April 2009)
- Lunar Crater Observation and Sensing Satellite, or LCROSS, sought to confirm presence of water ice at point of impact in Cabeus crater near moon's South Pole (June 2009)
- James Webb Space Telescope mirrors tested in Marshall's Cryogenic X-ray Calibration Facility (throughout 2009-2010)
- Final shuttle solid rocket motor test (February 2010)

Marshall's Impact on the Alabama Economy (FY2009)

Marshall also plays a key role in the economic success of Alabama. While Marshall's impact is strongest in the North Alabama region, all of Alabama benefits from the dollars that NASA brings to the state. The salaries and wages of those who work directly for Marshall and of those who are indirectly employed through various procurements and other expenditures made by Marshall impact the entire region. Tax revenues, research grants to universities, and outreach to educational organizations are all ways that Marshall benefits the state and the nation.

Pad Abort 1 test (May 2010)

Deep throttling test of Common Extensible Cryogenic Engine (CECE) (June 2010)

Last shuttle external tank rollout at Michoud (July 2010)

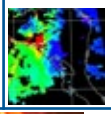
Shipment of FASTSAT micro-class satellite to Alaska for launch with six experiments onboard (August 2010)

Marshall 50-year anniversary (July 2010)

Test and manufacture of J-2X upper stage engine (September 2010)

Five-segment solid rocket motor test (DM-2) (September 2010)

Expansion of SERVIR network in cooperation with USAID to improve climate analysis for Himalayan region (September 2010)



Won role in Solar Probe Plus helping build an instrument for this next heliophysics flagship (September 2010)

An Engine of Opportunity for Alabama

$2.88 Billion

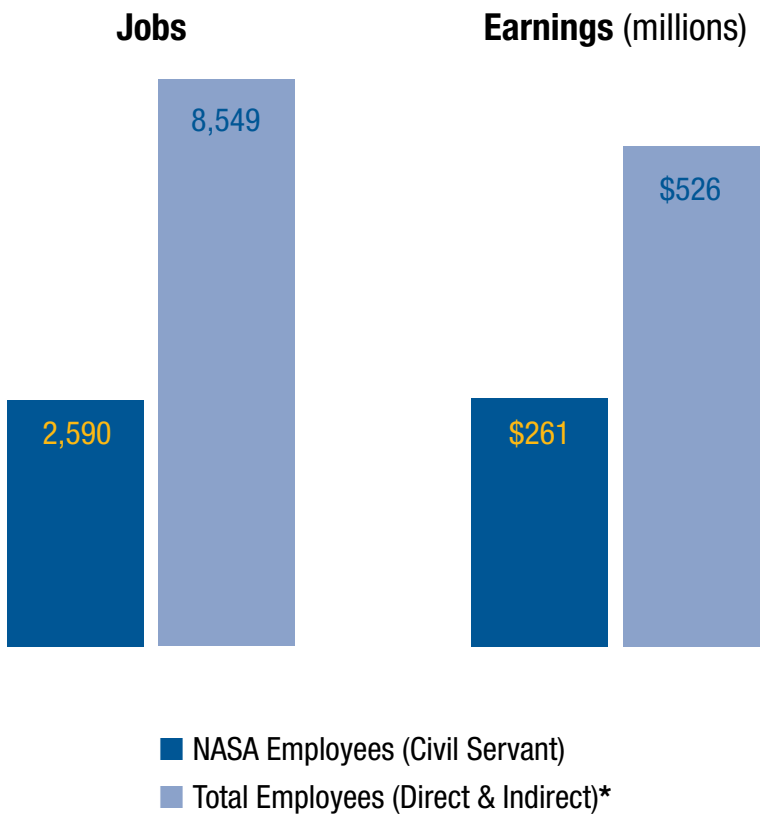
Marshall's Economic Impact in Alabama

Alabama Economic Impact FY2009

Marshall's impact in the state of Alabama in FY2009 includes a total of 8,549 jobs and $526.3 million in earnings. This includes 2,590 civil service jobs and 5,959 indirect* jobs. Marshall's other expenditures in Alabama exceeded $1 billion. These factors come together for a total Alabama economic impact of $2.88 billion.**

$2.88 billion economic impact**
8,549 jobs (direct and indirect)
$526.3 million earnings

$10.6 million local sales taxes
$8.5 million state sales taxes
$5.2 million local property taxes
$0.8 million state property taxes



* *Indirect jobs include contract employees and workers whose jobs are related to other Marshall expenditures.*

** *The Regional Input-Output Modeling System (RIMS II), developed by the U.S. Department of Commerce's Bureau of Economic Analysis, was used to estimate the impacts.*

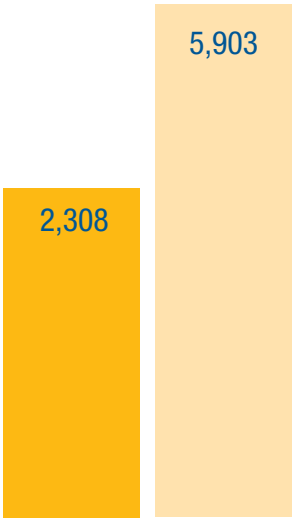
Alabama's Fifth Congressional District

Located in Huntsville, Marshall has a tremendous impact on the economy of North Alabama. In this report, the North Alabama area is defined as the Fifth Congressional District, which encompasses the counties of Colbert, Lauderdale, Lawrence, Limestone, Madison, and Jackson, and part of Morgan County. This district accounted for 5,903 of Marshall's jobs and $402.1 million in earnings including 3,595 indirect jobs*. The total economic impact on Alabama's Fifth Congressional District is $2.26 billion.

$2.26 billion economic impact
5,903 jobs (direct and indirect)
$402.1 million earnings

$7.2 million local sales taxes
$5.8 million state sales taxes
$4.3 million local property taxes
$0.6 million state property taxes

Jobs



Earnings (millions)

NASA Employees (Civil Servant)
Total Employees (Direct & Indirect)*

** Indirect jobs include contract employees and workers whose jobs are related to other Marshall expenditures.*

$2.26 Billion

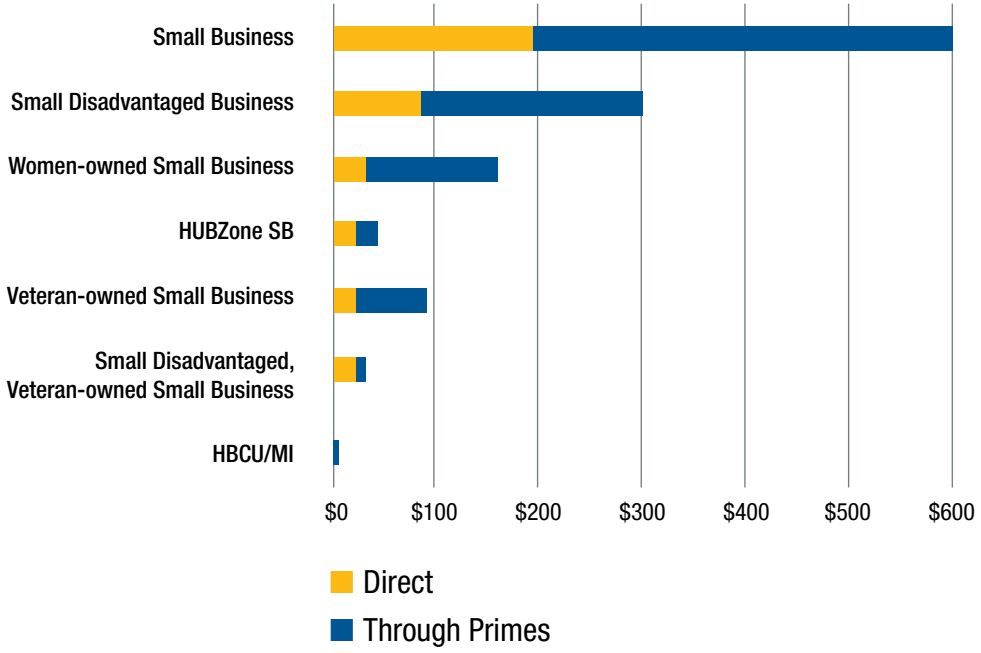
Marshall's Economic Impact in Alabama's Fifth Congressional District

Returns for the Community

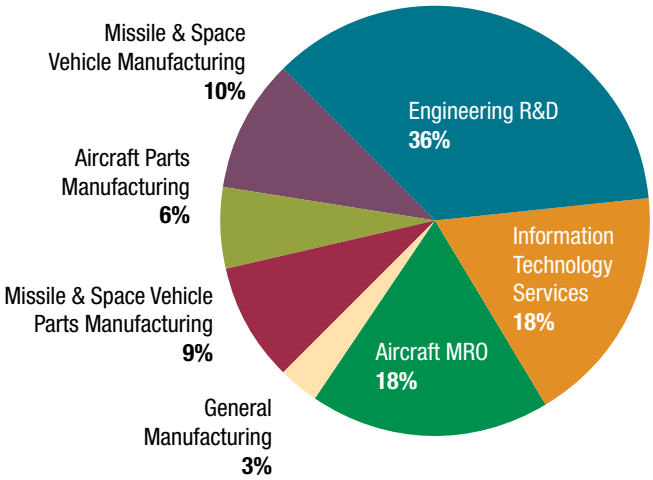
Sparking Small Business

In FY2009, Marshall obligated a total of $595 million to small business including both direct and subcontractor obligations. Direct obligations were $192 million (nearly 1/3 of total procurements). Marshall's prime contractors obligated $403 million to small businesses. The Small Business Office at Marshall is one of NASA's largest and was awarded NASA's Small Business Administrator's Cup in March 2011. The chart below illustrates the distribution of small business obligations by type.

Marshall Small Business Obligations (millions)



Alabama Aerospace Employment by Industry Sectors 2008



Alabama Aerospace Industry

NASA is a vital part of the total aerospace industry in Alabama. The total industry also includes DoD and aircraft manufacturing.

This chart shows Alabama's aerospace employment by industry sector. Engineering research and development is the largest percentage. Much of the work at Marshall and Redstone falls into this category.

Source: Alabama Aerospace Industry Association, "Industry Profile 2008–Aerospace in Alabama"

Spinoffs

The impact from work done at Marshall extends beyond NASA's primary missions and projects. In the last decade alone, Marshall generated more than 60 technologies featured as NASA spinoffs. Among these innovations are lifesaving robots, heat-shielding materials for firefighters and race car drivers, and improved welding techniques for manufacturing and defense applications.

Systems developed for astronauts on the space station have been used to provide clean water for soldiers in remote villages in Iraq.

An instrument developed for measuring thermal properties of spaceborne materials ensures consistent warmth for newborn babies in neonatal intensive care units.

A new type of orthotic knee joint designed by a Marshall researcher has helped thousands of people regain their ability to walk.

Engineers and scientists at Marshall will continue to develop new technologies for space that improve life on Earth. Learn more: **www.sti.nasa.gov/tto/**

Giving Back to the Community

Marshall employees also improve life on Earth through their contributions to the Combined Federal Campaign. These CFC dollars help support nonprofit organizations as they provide health and human service benefits throughout the region and the world. Marshall employees contributed more than $710,000 in FY2009. That is more than any other individual organization at Redstone or in the entire Tennessee Valley CFC. While Marshall represents only 17 percent of the valley's CFC employee base, the center's contributions represent 30 percent of the total Tennessee Valley campaign dollars.

In addition to financial contributions, Marshall employees and contractors volunteer with many different area organizations such as Care Assurance System for the Aging and Homebound (CASA).

$710,000
contributed to the Tennessee Valley Combined Federal Campaign

A Smart Place to Live, Work, and Learn

Impacting Regional Education Levels

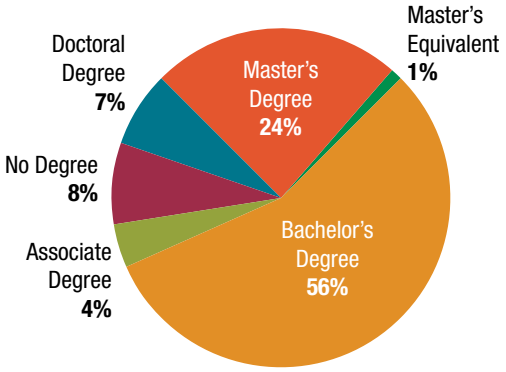
Marshall's influence on area education levels is significant. The highly technical skills employed at NASA require a well-educated workforce. Of the center's civil service employees, 88 percent have at least a bachelor's degree. One in three of those has a master's degree, and 25 percent of those with master's degrees have also earned doctoral degrees.

How does this compare?
Nationwide, 28 percent of people over the age of 25 have bachelor's degrees. That number drops to 21 percent for the state of Alabama. The Huntsville metro area is the highest in the state at 34 percent.

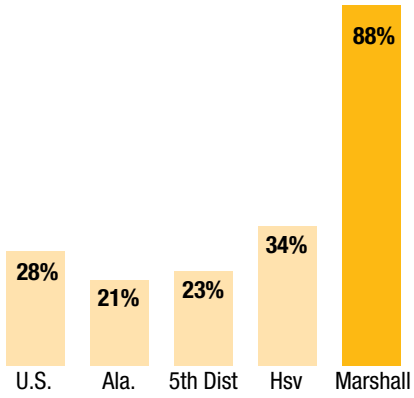
Looking at degrees held nationally, Huntsville ranks 76th out of 946 statistical areas, putting our area in the top 8 percent nationwide.

Source: http://factfinder.census.gov

Marshall Employees' Degree Levels



Percent with Bachelor's Degree or Higher



Education Outreach

Marshall seeks to engage the minds of bright young people and motivate them to study science and technology so they can carry on the tradition of research and exploration. The center's education and outreach teams provide informal educational opportunities for all ages through a number of outreach programs that include:

- Traveling exhibits
- Speakers Bureau
- Great Moonbuggy Race
- Student Launch Initiatives
- College co-op and internship programs
- University research programs
- National Education Resource Center for Teachers

Creating an Education-rich Environment

Marshall's first center director, Dr. Wernher von Braun, understood the importance of creating a research and development community with a university at its core. This facility would help train the workforce for NASA, create additional opportunities for research and development, and serve as the heart of a research community. He worked closely with community leaders to garner support for creating a university campus in Huntsville. This campus became the University of Alabama in Huntsville.

UAHuntsville now maintains the highest rated engineering management program in the country*. Huntsville is also home to Alabama A&M University and Oakwood University. Nearby higher education institutions include Athens State University, the University of North Alabama, Snead State Community College, Calhoun Community College, and J.F. Drake State Technical College. In addition, the Huntsville area includes satellite campuses for several national college and university programs, including the Florida Institute of Technology at Redstone, Virginia College, Faulkner University, and the Defense Acquisition University.

There is a special synergy in Huntsville with government, business, and university research working together on a national scale. This makes the Huntsville community one of the country's premier centers for aerospace excellence.

** Source: Aerospace/Defense Industry Profile, Chamber of Commerce of Huntsville/Madison County*

Supporting Educational Institutions

By maintaining a highly educated workforce in North Alabama, NASA enhances economic growth and provides a valuable resource for businesses and the local community. To foster this growth, the agency supports area educational institutions with procurements and grants. In FY2009, NASA provided more than $35 million to educational institutions and nonprofit organizations in Alabama. Approximately $33 million of this amount was provided by Marshall. The center invested more than $118 million in academic institutions and nonprofit organizations across the country in FY2009.**

*** Source: Procurement's NPDV Ad hoc Query System*

Marshall hosts and manages the NASA Student Launch Initiatives. SLI involves middle, high school, and college students in designing, building and testing reusable rockets with associated scientific payloads. This unique hands-on experience allows students to demonstrate proof-of-concept for their designs and makes abstract concepts tangible.

Learn more:
education.msfc.nasa.gov/sli

A Science and Engineering Hub

*** Fortune 100 aerospace and defense companies in Cummings Research Park**

- Boeing
- United Technologies
- Lockheed Martin
- Northrop Grumman
- General Dynamics
- Honeywell International
- Raytheon

America's Aerospace and Defense — Anchored at Redstone Arsenal

Marshall Space Flight Center was initially founded as a science and engineering center out of U.S. Army facilities and expertise in 1960. The relationship between the Army and Marshall continues as the two work together on research and development of propulsion and related technologies. Marshall resides on the Army's Redstone Arsenal, a major federal research, development, test, and engineering center. Redstone is home to the Army's missile, missile defense, and aviation programs; the Missile Defense Agency; the Defense Intelligence Agency; and NATO's Medium Extended Air Defense System (MEADS) program.

Second Largest Research Park in the United States

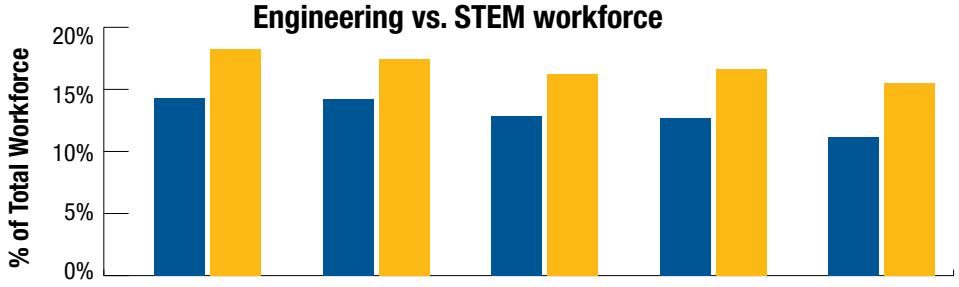
Marshall's impact includes support to contract companies, many of which are located adjacent to Redstone Arsenal in Cummings Research Park. As the nation's second largest research park, CRP hosts 37* Fortune 500 companies, with more than half supporting NASA's work at Marshall.

Numerous Fortune 500 companies and global technology corporations have major operations in CRP performing aerospace and defense technology research and development. This large pool of technical expertise gives the Huntsville community the highest concentration of engineers in the country.

Huntsville ranks third in the nation for the percentage of workforce involved in science and engineering. Huntsville ranks fourth in the percent of workers in STEM (Science, Technology, Engineering, and Mathematics.) STEM occupations at Marshall represent 75 percent of civil service workers. This high percentage contributes significantly to Huntsville's high rankings.

** Source: "Fortune 500 companies in CRP – 2010," www.huntsvillealabamausa.com*

National Rankings in Science and Engineering vs. STEM workforce



	San Jose-Santa Clara, Calif.	Boulder, Colo.	**Huntsville, Ala.**	Framingham, Mass.	Durham, N.C.
S&E occupations	14.3%	14.2%	**12.8%**	12.7%	11.1%
STEM occupations	18.2%	17.4%	**16.2%**	16.6%	15.5%

Source: 2010 Science and Engineering Indicators, Table 3-8, published by the National Science Board

Synergy for a Strong Economic Base

The partnerships among Marshall, Redstone, and the industries in Cummings Research Park draw much recognition for the area as one of the nation's leading science and engineering communities.

- **America's Top 5 Technology Cities**
  Computerworld

- **Top 10 U.S. Metros for Scientists and Engineers**
  Expansion Management

- **Top 10 Smartest Cities in the World**
  Forbes

- **Top 10 Places for Tech Jobs in the U.S.**
  U.S. News & World Report

Source: www.huntsvillealabamausa.com

The economic impact analysis presented in this report was based on research conducted by the University of Alabama's Center for Business and Economic Research using the Regional Input-Output Modeling System (RIMS II), developed by the U.S. Department of Commerce's Bureau of Economic Analysis.

Marshall's relationships with industry, academia, and the nation's defense agencies create unique synergies, strengthening the area's economic base.

Contributing to Alabama's Economy and Culture

During its 50-year history, Marshall Space Flight Center has developed strong relationships with industry, academia, and the nation's defense agencies. As a result, the center creates an employment and education hub that draws top scientists and engineers as well as experts in many other fields from around the nation.

North Alabama benefits from highly competitive salaries and enjoys a business environment that attracts well-established companies and promotes the development of new businesses. Educational opportunities surrounding this high-tech community attract the bright young people who will become our nation's next generation of scientists and explorers.

A valuable asset to the state and the nation, Marshall Space Flight Center continues to build on its distinguished history. The center plays a key role in NASA's science and engineering accomplishments and remains a strong engine of opportunity for Alabama.

National Aeronautics and Space Administration

George C. Marshall Space Flight Center
Huntsville, AL 35812
www.nasa.gov/marshall

www.nasa.gov

NP-2011-03-038-MSFC
8-488234